

## TWO NEW SPECIES OF TWO NEW GAMMARIDAN GENERA (CRUSTACEA: AMPHIPODA) FROM THE FLORIDA KEYS

James Darwin Thomas and J. Laurens Barnard

*Abstract.*—Two new species of the new genera *Anamaera* (*A. hixonii*) and *Spathiopus* (*S. loeensis*), both belonging to the section Gammarida of Amphipoda, are described from the Florida Keys. *Anamaera* is a new genus close to *Maera*, *Ceradocus*, and *Ceradomaera*, but has a unique combination of minor character expressions. Males of *Spathiopus* have an unusual paddle-shaped antenna 2 but otherwise *Spathiopus* appears to be an apomorph of *Elasmopus*.

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The new taxa described herein were collected at Looe Key Reef, off Big Pine Key in the Florida Keys. Looe Key Reef is now a National Marine Sanctuary of the United States of America and the amphipods described herein were collected while compiling a faunal list of the Sanctuary.

### Section Gammarida

The reader is referred to Barnard and Barnard (1983) for a discussion of classification in this group and the advisability of omitting commitment to superfamilies and families until more studies on morphology, behavior, and genetics have been completed. These genera would probably be assignable to the hadzioid (=melitoid) family group depicted by Bousfield (1978, 1983) but we cannot find any characters to separate that group from others, except Anisogammaridae, in the greater Gammarida (section) group of Gammaridea. Anisogammaridae have accessory gills and are quite distinctive. Crangonyctoids (with or without sternal gills and with or without paddle calceoli), melitoids-hadzioids (without gill 7), gammaroids (with or without gill 7) and other groups in Gammarida are as yet not well described and are poorly defined.

*Legends.*—Capital letters denote main parts in the following list; lower case letters to left of capital letters or in body of figure indicate modifications as follows; lower case letters to right of capital letters indicate specimens described in captions: A, antenna; B, body; C, coxa; D, dactyl; F, accessory flagellum; G, gnathopad; H, head; I, inner plate or ramus; J, prebuccal; K, lacinia mobilis; L, labium; M, mandible; O, outer plate or ramus; P, pereopod; Q, incisor; R, uropod; S, maxilliped; T, telson; U, labrum; V, palp; W, pleon; X, maxilla; Z, gill; a, aberrant; f, flat; left, lateral; m, medial; n, dissected; o, opposite; r, right; s, setae removed.

### Family Gammaridae (classical sense)

#### *Spathiopus*, new genus

*Diagnosis.*—Body lacking dorsal teeth. Rostrum obsolete. Antenna 1 longer than antenna 2, article 2 longer than 1, article 3 short, secondary flagellum

2-articulate, calceoli absent. Article 5 of antenna 2 shorter than article 4, flagellum in male flat from side view but articles expanded into broad paddle from dorsoventral views. Mandibular incisors weakly toothed, laciniae mobilae toothed, rakers present, molars triturative, molar surface with large accessory knobs or "choppers," palp article 3 falcate. Inner lobes of lower lip fleshy. Medial margins of inner plates on maxillae almost naked, apex of inner plate on maxilla 1 with about 4 setae, palp 2-articulate. Maxillipeds ordinary but inner plates lacking stout thick spines, dactyl weakly unguiform, with large nail. Anterior coxae of medium length, none strongly reduced in size, coxa 4 weakly excavate posteriorly. Gnathopod 1 of melitid form (see Barnard & Barnard 1982 for definition), thus wrist elongate, setose and poorly lobed, hand shorter, subrectangular, palm short and weakly oblique; gnathopod 2 of male enlarged, subchelate, wrist short and lobate, hand elongate, large, palm oblique. Pereopods short. Epimera and pleopods well defined and ordinary. Uropods 1-3 short, stout, spinose, outer ramus of uropod 3 with minute second article. Telson fully cleft, all major spines apical. Gills present on coxae 2-6, thin oostegites present on coxae 2-5.

*Type-species.*—*Spathiopus looensis*, new species.

*Etymology.*—Named for the spatulate condition of the flagellum of antenna 2. This condition is present in both sexes, but is best developed in adult males.

*Relationship.*—This genus appears to be an apomorph of various species in *Elasmopus* Costa as it differs substantially only in the expansion of the articles on the flagellum of antenna 2. This unusual character is also accorded generic status in the *Gammaropsis-Audulla* pair of genera in the Corophioidea and probably indicates a special function associated with the structure.

*Spathiopus looensis*, new species

Figs. 1-3

*Description:* Holotype male "g" 4.31 mm.—Eyes ovate, small, brown in alcohol, with halo of free ommatidial elements around pigment core. Lateral cephalic lobes with small notch below eyes. Article 1 of peduncle of antenna 1 with line of 3 ventral spines. Flagellum shorter than peduncle, aesthetascs absent.

Labrum broadly heart-shaped, epistome unproduced. Right and left rakers 3 and 3 (first left raker complex), each molar with spinose protrusion and major seta, palp article 3 with DE setae. Each outer lobe of lower lip with cone. Inner plate of maxilla 1 with 2 large and 3 small apical or outer setae, outer plate narrow, with 7 spines, palp broader than outer plate and with densely armed apex, palps symmetrical. Inner plate of maxilla 2 narrower than outer, with 1-2 apicomedial setae. Inner plate of maxilliped with falcate ventral coupling hook, outer plate with medial and apical spines, article 3 with serrate apical hook.

Coxa 1 extended forward anteroventrally. Gnathopod 1 as illustrated, article 4 of gnathopod 2 with lobe underriding article 5, latter also with weak apical lobe pointing distad, palm or hand densely setose and smooth, merging evenly with posterior margin of hand, dactyl short, medial surface with longitudinal ridge confining dactyl override, ridge sinuous and unevenly serrate. Pereopods 3-4 of similar structure but pereopod 4 smaller, article 5 with pair of large apicoposterior spines, apicalmost pair of spines on article 6 slightly smaller than preceding spine pairs, dactyl with 3 setules at declivity. Article 2 of pereopods 5-7 pyriform,

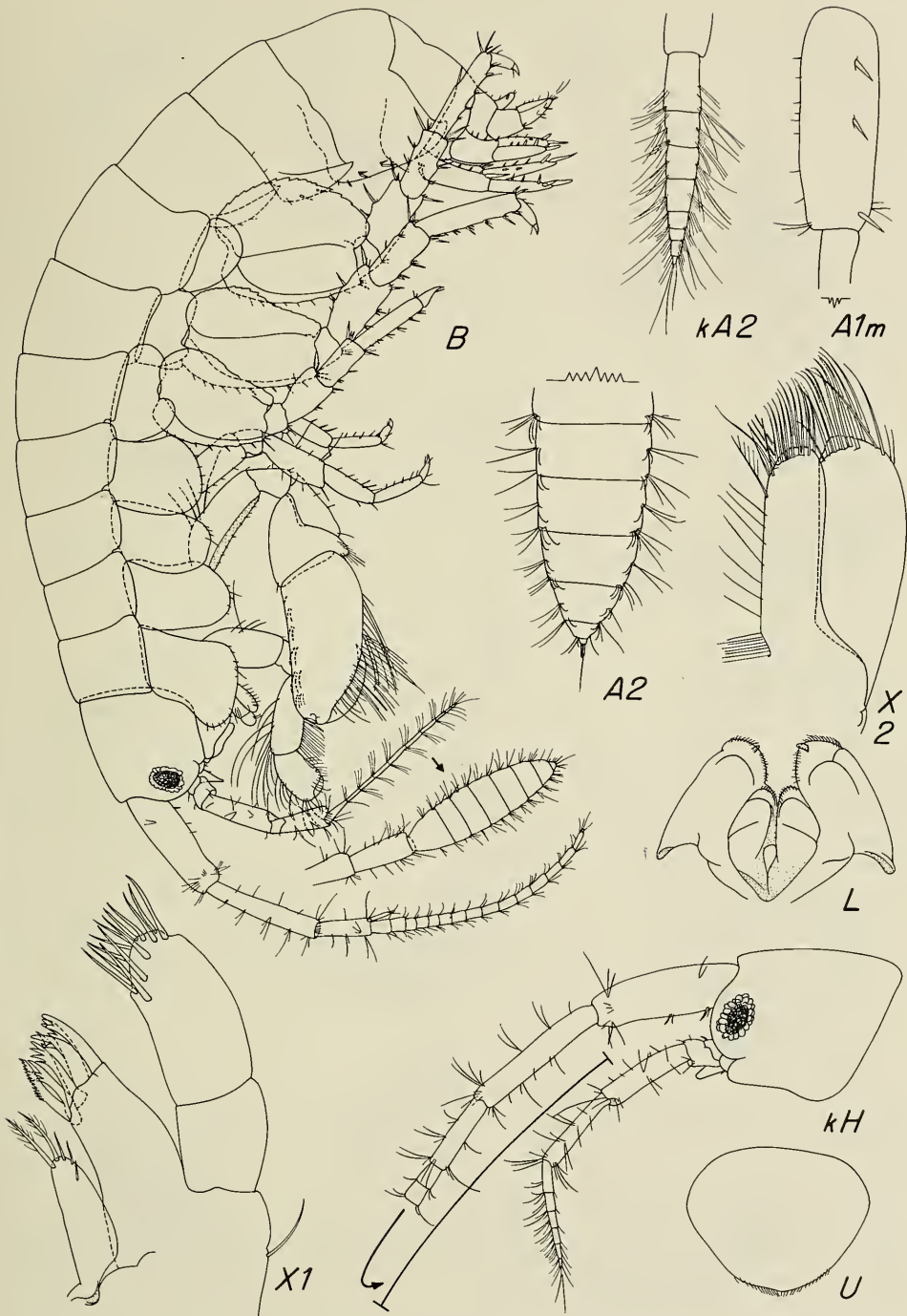


Fig. 1. *Spathiopus loeensis*. Unattributed figures = holotype male "g" 4.31 mm; i = male "i" 4.77 mm; k = female "k" 4.47 mm.

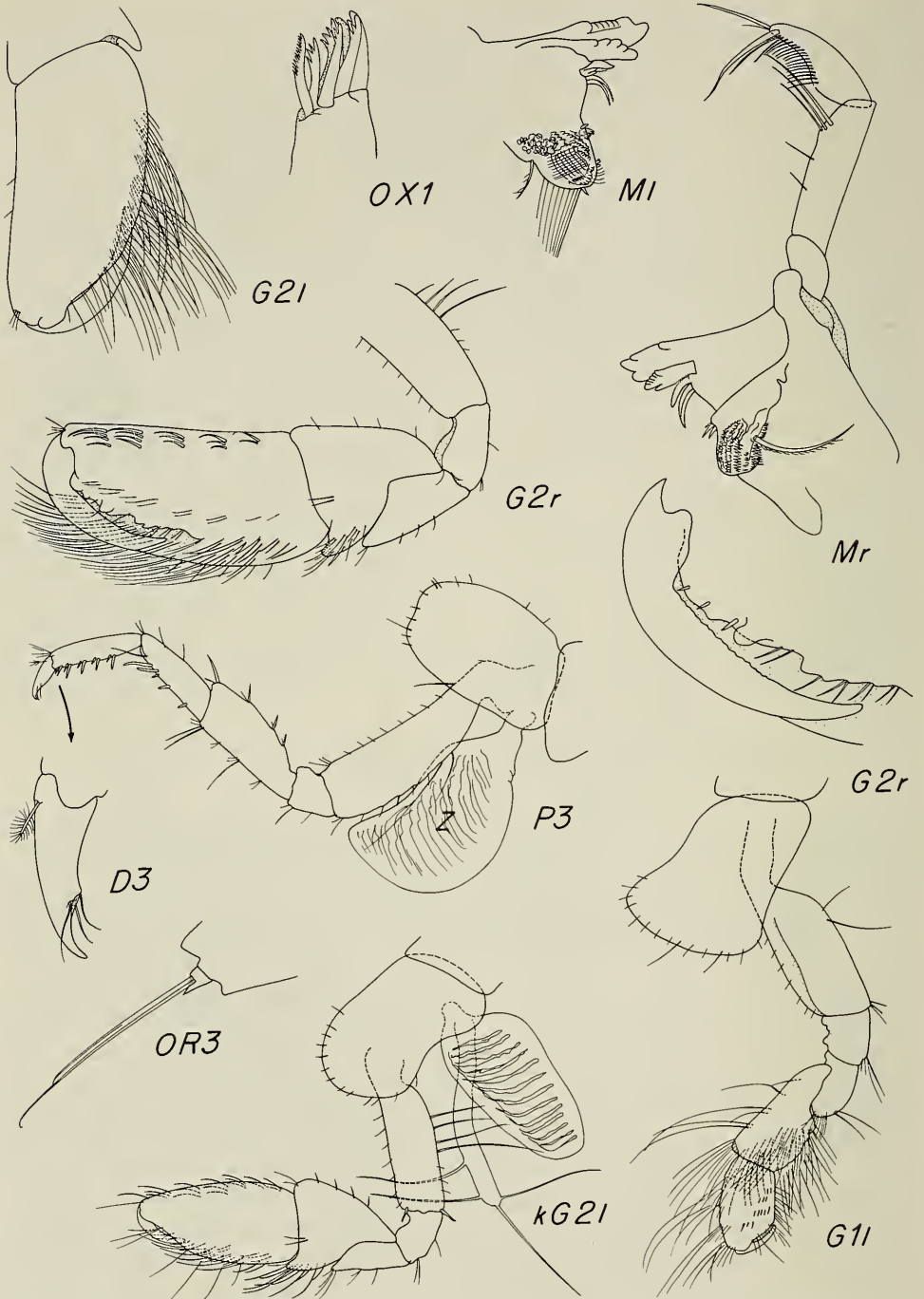


Fig. 2. *Spathiopus loensis*. Unattributed figures = holotype male "g" 4.31 mm; k = female "k" 4.47 mm.

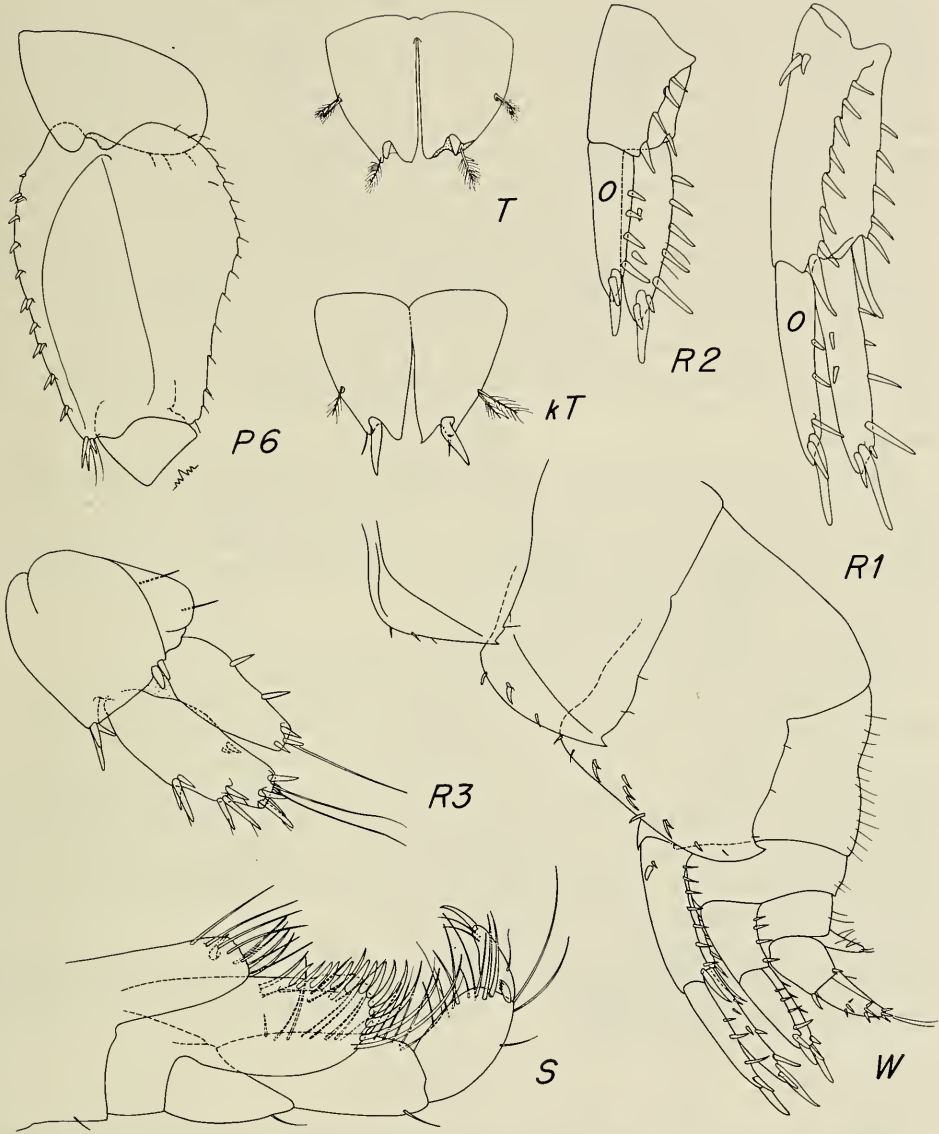


Fig. 3. *Spathiopus loensis*. Unattributed figures = holotype male "g" 4.31 mm; k = female "k" 4.47 mm.

tapering apically, weakly lobate, face with outer ridge (pereopod 5) or ridges (pereopods 6-7). Gills on coxae 2-6, that on coxa 3 longest, those on coxae 2-4 subequal, club-shaped, flat, that of coxa 5 similar but smaller, that of coxa 6 smallest and almost orbicular.

Epimera 1-3 with small sharp posteroventral tooth, margin above with 1-2 setule notches, ventral spine formula of epimeron 1 = 1-1-1, on face of epimeron 2 = 1-1-1, on epimeron 3 = 1-1-2-3-2-1-1. Urosomite 1 with ventral spine, basal face of uropod 1 with pair of spines, dorsal margin of peduncle with 7 short spines,

apex with a single large spine, similar large spine medially, peduncle of uropod 2 with 4 short dorsolateral spines, rami of uropods spinose like *Elasmopus*. Uropod 3 short, peduncle expanded and plate-like, inner ramus slightly smaller than outer, with 2 medial spines, outer ramus lateral spine formula = 3-3, apical spines = 4, apical spines on inner ramus = 3; article 2 on outer ramus with 2 setae. Telson short, broad, lobes tapering but apically notched, inner wing sharp, each notch with stout (abnormally stunted) spine, lateral margins each with pair (or abnormally one seta) of setules, each lateral apical wing with setule.

Female "k" 4.47 mm.—Like male but flagellum of antenna 2 only weakly expanded and only scarcely longer than article 4 of peduncle, article 5 of peduncle not shortened; gnathopod 2 much smaller than male and hand lacking medial ridge. Armament formula on epimeron 2 = 1-2-1-2, epimeron 3 = 1-2-3-3-2-1. Ventral facial spines on outer ramus of uropod 3 reduced to 1. Oostegites thin, setal formula of oostegites 1-4 = 2-2-3-3, anterior, 1-2-2-1 distal, and 1-2-1-2 posterior.

*Variations*.—Adults relatively uniform, male "i" like holotype but telsonic spines not stunted and normally long as shown for female telson. Male "h" telson also normal, spine count on epimeron 2 = 1-3-1-0, epimeron 3 = 1-3-4-2-3-0. Telson normal (with lateral setae in pairs but many specimens with setae reduced to one on one side or the other).

*Etymology*.—Named for the type-locality.

*Holotype*.—USNM 195127, male "g" 4.31 mm, illustrated.

*Type-locality*.—Florida Keys, Looe Key Reef, 9 Oct 1983, in backreef area, in algae-covered rubble in sand, 1 m, station LKR4H, coll. J. D. Thomas.

*Material*.—The type-locality, male "h" 3.96 mm (observed), male "i" 4.77 mm (observed), female "k" ovigerous 4.47 mm (illustrated) and 8 other specimens. Same area, 7 m, 8 Oct 1983, station LKFR4C, coll. J. D. Thomas (4). Biscayne Bay, Ragged Keys, 1200 feet west of marker no. 5 in channel between two keys, 2 m, 8 Apr 1982, coll. Iver M. Brook and J. D. Thomas (10); same area, Oct 1982, coll. Biosystems, Inc. Station # 16 (30).

*Distribution*.—Florida, Biscayne Bay south to Looe Key Reef, 1-7 m, occurring primarily in backreef areas of coral reefs in rubble, and in other shallow protected areas adjacent to deeper water where algae covered rocky substrates are available.

#### *Anamaera*, new genus

*Diagnosis*.—Body lacking dorsal teeth. Rostrum weak. Antenna 1 longer than antenna 2, article 2 longer than 1, article 3 short, secondary flagellum 3-5-articulate, calceoli absent. Article 5 of antenna 2 shorter than article 4, flagellum cylindrical. Mandibular incisors strongly toothed, laciniae mobiles toothed, rakers present, molars triturative, palp article 3 linear, about as long as article 2, with A, D and E setae sparse. Inner lobes of lower lip fleshy. Medial margins of inner plates on maxillae naked, at best bearing hair-like armaments. Apex of inner plate on maxilla 1 with about 5 setae, palp 2-articulate. Maxillipeds ordinary but inner plates lacking stout thick spines, dactyl weakly unguiform, with large nail.

Anterior coxae of medium length, none strongly reduced in size, coxa 2 largest, coxae 1-4 weakly excavate posteriorly, coxa 1 with anteroventral tooth and posteroventral cusp. Gnathopod 1 of melitid form (see Barnard and Barnard 1983,

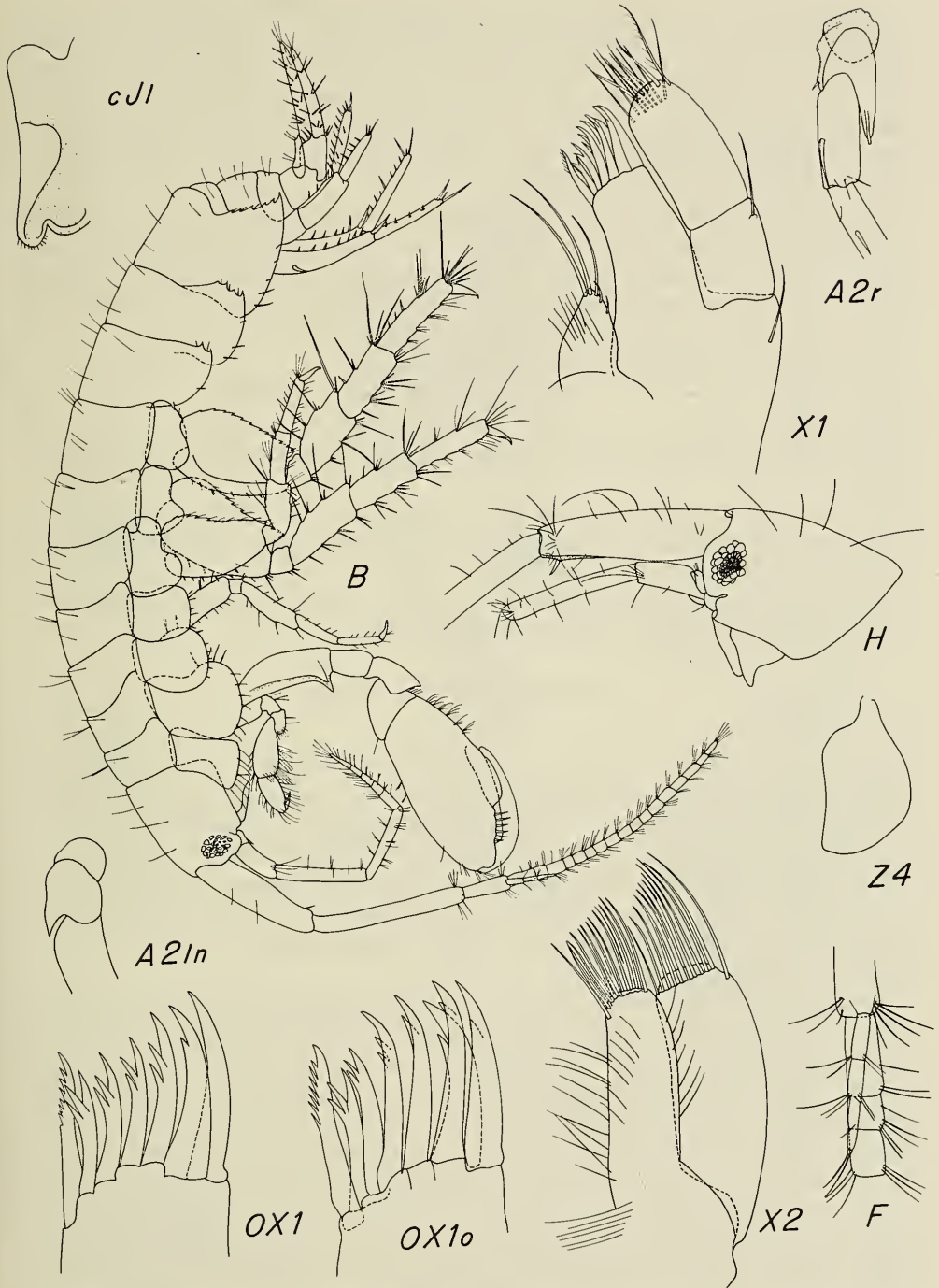


Fig. 4. *Anamaera hixonii*. Unattributed figures = male holotype "a" 5.22 mm; c = female "c" 4.04 mm; d = female "d" 3.10 mm.

for definition), thus wrist elongate, setose and poorly lobed, hand shorter, subrectangular, palm short and oblique; gnathopod 2 of male asymmetrical, one side enlarged, subchelate, wrist short and lobate, hand elongate, large, palm oblique and continuous with hind margin of hand; other side small like gnathopod 1 and similar, wrist elongate, unlobed, hand somewhat broader and longer than on gnathopod 1, palm oblique, anterior margin of hand more setose, posterior setae more curved apically. Pereopods short.

Epimera serrate behind. Pleopods well defined and ordinary. Uropods 1-3 long, slender, spinose, basal face of uropod 1 with spine, peduncle of uropod 3 scarcely elongate, rami equiramous though outer ramus with minute second article. Telson fully cleft, lobes pointed, cuspidate, with apical and dorsofacial spines. Gills present on coxae 2-6, thin oostegites present on coxae 2-5.

*Type-species.*—*Anamaera hixoni*, new species.

*Etymology.*—Named for the concept as “variant Maera,” thus “ana” reflecting Greek “again.”

*Relationship.*—Differing from *Maera* Leach in the asymmetry of male gnathopod 2.

Differing from *Ceradocus* Costa in the long article 3 of the mandibular palp, lack of tooth on article 1, the poorly setose medial margins of maxillae 1-2, and the absence of dorsal body serrations.

Differing from *Ceradomaera* Ledoyer, 1973 in the lack of dorsal teeth on the pleon and the long article 3 of the mandibular palp.

*Anamaera hixoni*, new species

Figs. 4-7

*Description:* Holotype male “a.”—Body generally similar to *Elasmopus* and *Maera*, sparsely setose dorsally, with long antenna 1 and short antenna 2. Head with anteroventral notch and sinuous tooth below, eye of medium size, with brownish purple core surrounded by clear apices of ommatidia. Article 1 of antenna 1 about as long as head, flagellum shorter than peduncle. Gland cone of antenna 2 very long (aberrantly short and regenerant on left side in holotype and other specimens but normally long on both sides), flagellum about as long as article 4 of peduncle.

Epistome produced upward and forward slightly, upper lip from anterior view with truncate, almost smooth ventral margin. Mandibles bulky, with large inner vertical keel bearing small but strongly trititative molar ventrally, each molar with plumose seta, incisors toothed, right lacinia mobilis bifid and complexly multitoothed, left lacinia mobilis flattened and 4-toothed, rakers about 7, palp article 1 scarcely elongate, article 2 of medium length, article 3 linear, about as long as article 2, with 1 A seta, 4 D setae and 2 E setae. Mandibular lobes of lower lip weak, broad, obtuse. Inner plate of maxilla 1 small, longer than broad, with 2-3 long apical and 3-2 small apicolateral setae; outer plate narrow, with 11 spines (some hidden in illustrations), palp broad, 2-articulate, with 2 ranks of apical and subapical armaments, right and left sides symmetrical. Plates of maxilla 2 erect, long, slender, inner narrower, armed medially only with thin hair-like armaments, no orthodox setae medially. Inner plate of maxillipeds excavate, with long lateral and small medial cusp, no stout apical spines, with several medial



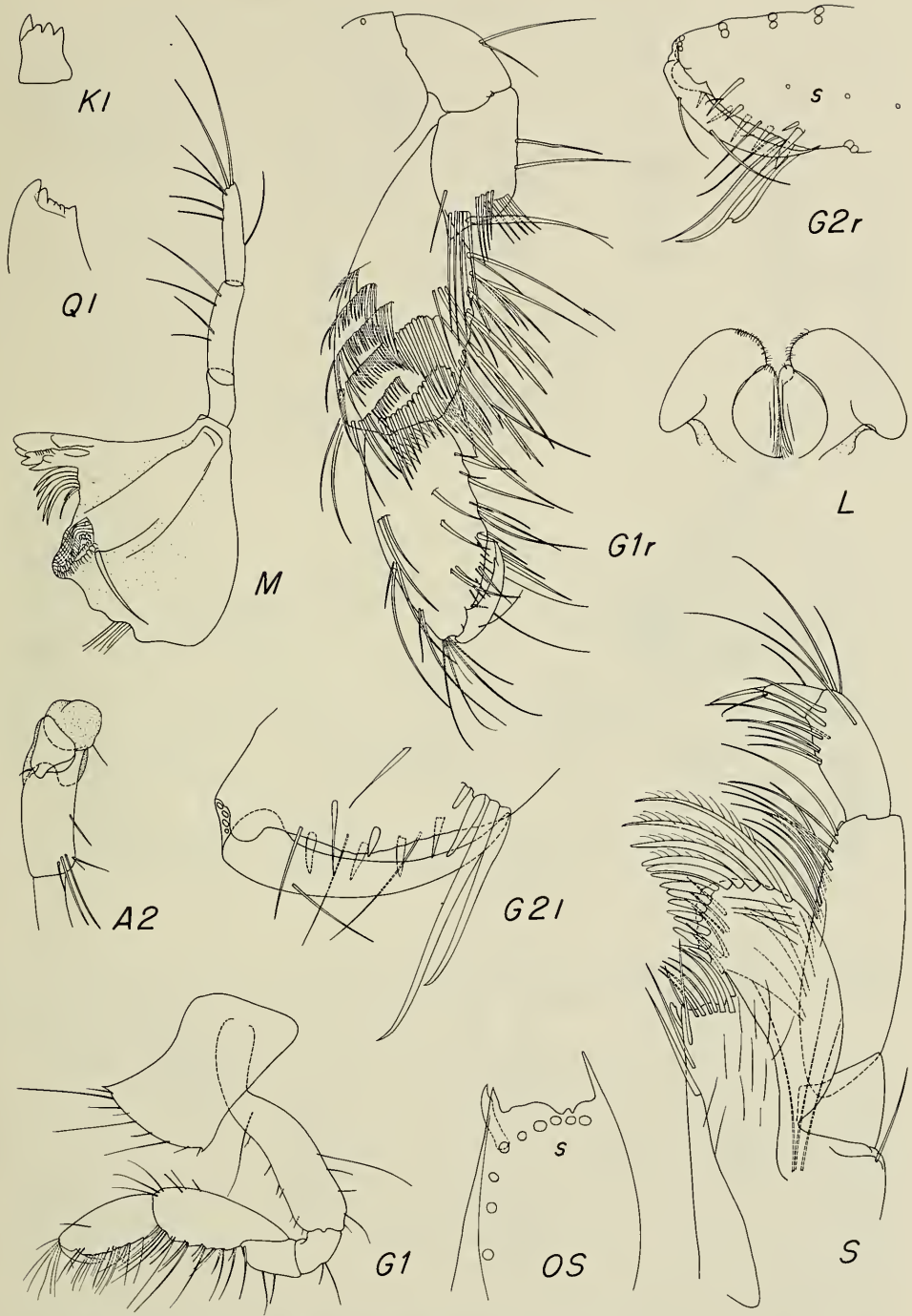


Fig. 5. *Anamaera hixonii*. All figures = male holotype "a" 5.22 mm.

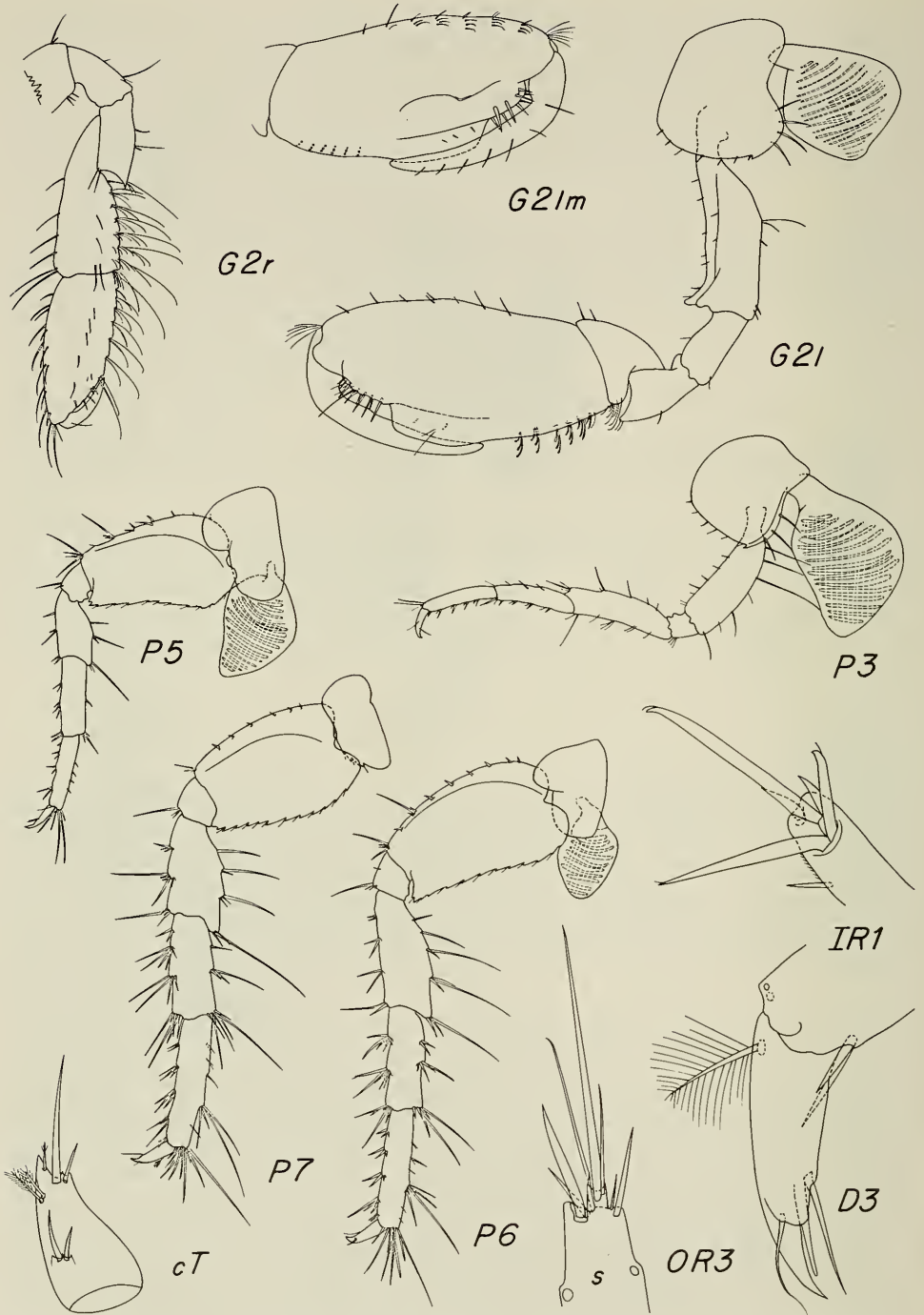


Fig. 6. *Anamaera hixoni*. Unattributed figures = male holotype "a" 5.22 mm; c = female "c" 4.04 mm.

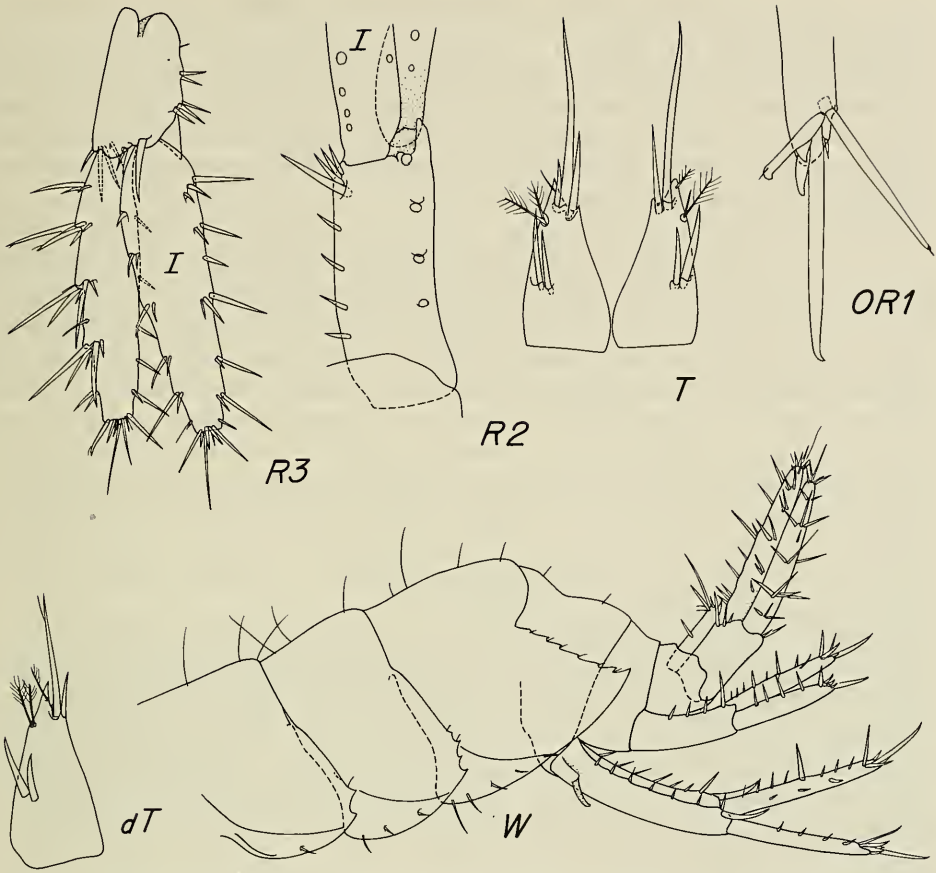


Fig. 7. *Anamaera hixoni*. Unattributed figures = male holotype "a" 5.22 mm; d = female "d" 3.10 mm.

and apical setae, outer plate large, with blunt medial spines and many apical spines becoming thinner apicad, palp slender, elongate, dactyl stubby-unguiform, nail strong, with 1+ accessory nail(s).

Coxa 1 with anterior excavation and anteroventral sharp cusp pointing forward, coxa 2 much larger, anterior margin straight, but posterior excavate, thus ventral half of coxa appearing swollen, coxa 3 similar but much smaller, coxa 4 somewhat more quadrate, coxae 5-7 scarcely but successively shorter, ordinarily lobate, coxae 1-4 with short ventral setae, coxae 2-3 with 4 and 3 posterior spines.

Article 5 of gnathopod 1 with very dense medial comb of spines. Article 2 of larger male gnathopod bearing anteroapical pair of cusps representing terminus of inner and outer anterior keels, article 3 of gnathopod 2 slightly elongate, article 4 with sharp posterodistal cusp pointing distally; palm of larger male gnathopod with distal spinose margin bearing inner and outer rows of 5 and 4 spines, then adjacent acclivity with flat topped smooth proximal lobe bearing few largely facial setae, dactyl simple (with marginal setae), extending halfway along palmar-hand margin, proximal part of this margin with setal tufts. Palm of smaller gnathopod

2 short, oblique, with sparse short spines and defined by row of 4 long and short setal-spines in tandem cluster.

Coupling spines of pereopods 3–7 small, slightly uneven, simple, dactyls with acclivity marked by whip, bearing 2 other setules, one marginal, one facial; article 2 of pereopods 5–7 weakly expanded, with one facial ridge, posteroventrally lobate subsharply, posterior margins with medium serrations, some spines of articles 4–6 as long as or longer than article 5.

Epimera 1–3 each with lateral ridge, formula of ventrofacial spines on epimera 1–3 = 1-3-5, formula of posterior serrations (counted as points) = 2-4-7. Pleonites dorsally smooth, pleonite 4 weakly humped dorsally. Basofacial spine of peduncle on uropod 1 attached to raised lateral plaque, each peduncular apex with large spine, medial margin with 8 smaller spines (otherwise as illustrated), medial margin of peduncle on uropod 2 with 4 spines in tandem but apically with row of 4 or 5 spines forming fan and attached in dorsoventral row (otherwise as illustrated), apices of outer rami on uropods 1–2 alike, with 4 large and one tiny spines, of inner rami with 5 large spines. Uropod 3 overextending uropods 1–2, peduncle complexly spinose, outer ramus slightly shorter than inner, both rami complexly spinose. Telson with middorsolateral pair of spines, each obliquely excavate, apex with pair of long spines, sharp apex with lateral setule, also pair of setules proximal and lateral to apex.

Female “c” 4.04 mm.—Generally like male but both sides of gnathopod 2 small, like small version of male gnathopod 2 (not therefore reillustrated). Antennae, gnathopod 1 and epimera like male. Some spines on coxae 2–3, uropod 3 and telson either longer or shorter than shown for male but these differences proved not to be of sexual value, merely individual variation in both sexes. (Telson illustration therefore to be discounted.) Oostegites long and thin, on coxae 2–5, apical setal formula = 3-3-3-4, anterior setae = 2-1-1-0, posterior setae = 1-1-1-0, posterior setules = 1-1-1-6.

*Variations.*—Either right or left gnathopod 2 of male enlarged. Males and females found to vary in spine lengths especially on telson and uropod 3.

Young female “d” with 3 articles in accessory flagellum, 4 in flagellum of antenna 2. Spine count on coxae 2-3 = 4-3. Spine count on epimera 1,2,3 = 1-3-4, posterior points on epimera 1,2,3 = 2-2-5. Apex of each telsonic lobe with 2 spines, outer long, inner short; each dorsal spine pair with outer longer than inner.

Male “e” also with left gland cone stunted and probably regenerant as in holotype. Gnathopod 2 apical spine area of palm with 4 and 4 spines; coxa 2 with 5 posterior spines, coxa 3 with 3.

Male “f” with apical spine area on male gnathopod 2 palm bearing 8 and 6 spines. Spine counts on epimera 1,2,3 = 1-3-5.

*Illustrations.*—Views of holotype gland cone on antenna 2 showing left views on left antenna 2 (gland cone stunted) and right antenna 2 (from medial view) intact and then a left dissected view to show dorsal tooth of article 2 seen only medially.

*Color.*—Body white and wine-rose, rose color forming diffused blotches, bands and spots as follows: core of eye; base of rostrum between eyes; scattered dorsal diffusion on pereonites 1–7, on pereonites 1–2 occurring middorsally and extending laterally as blotches, on pereonites 3–7 occurring as band at posterior margin; oblique slashed from belly of pleonites 1–3 showing through epimera;

light dorsal transverse band each on pleonites 1–3; basal blotch each in peduncles of uropods 2 and 3 and each lobe of telson.

*Food.*—Stomach contents include substantial volumes of sand grains and broken pieces of filamentous algae and other brown, green and ochraceous minute particles of organic matter.

*Etymology.*—Named in honor of Ray F. Hixon (10 June 1947 to 19 Mar 1984), a rare and extraordinary person who spent many hours in the waters of Biscayne Bay and the Florida Keys.

*Holotype.*—USNM 195126, male, “a” 5.22 mm (illustrated).

*Type-locality.*—JDT LKR 4H, Florida Keys, Looe Key, 1 m, 9 Oct 1983, algae covered rubble on sand, coll. J. D. Thomas.

*Material.*—Type-locality, female “b” 3.72 mm, female “c” 4.04 mm, young female “d” 3.10 mm. Biscayne Bay, Florida, Ragged Keys, in channel between two keys, 2 m, coll. Iver M. Brook and J. D. Thomas, male “e” 4.28 mm, male “f” 4.50 mm.

*Distribution.*—Florida from Biscayne Bay south to the Lower Florida Keys, 1–2 m.

#### Acknowledgments

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(JDT) Newfound Harbor Marine Institute, Rt. 3, Box 170, Big Pine Key, Florida 33043. (JLB) Department of Invertebrate Zoology, NHB-163, Smithsonian Institution, Washington, D.C. 20560.